Spectral, Radiometric and Geometric Calibration of the Airborne Visible-Infrared Imaging Spectrometer in the Laboratory and Validation of the Calibration Inflight

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ABSTRACT

Calibration of remote sensing instruments is required to: (1) derive quantitative parameters' of the Earth's surface and atmosphere, (?) measure changes from region to region and from time to time, (3) compare data between di fferent sensors and, (4) analyze sensor measured data with process model predictions.

The Airborne Visible-Infrared Imaging Spectrometer (AVIRIS) is a NASA-sponsored Earth-looking imaging spectrometer designed, built and operated by the Jet Propulsion Laboratory. AVIRIS acquires flight data from the Q-bay of a NASA ER-2 that is operated from the Ames Research Center. This imaging spectrometer measures the total upwelling spectral radi ante from *400* to *2500* nm through ??4 channels at 10 nm spectra] intervals. Data are acquired as 11 **km by** up to 100 **km** imageswith20m by 20 m spatial resolution.

With four spectrometers, 224 detectors anti a desmodromic whisk broom scanner, AVIRIS presents a special chal 1 enge for absolute spectral , radiometric and geometric calibration in the laboratory arid mai ntenance of that calibration in flight.

We describe the procedures and standards used in 1993 for the spectral, radiometric and geometric calibration of AVIRIS in the laboratory. These procedures and standards have evolved significantly in the past several years towards the objective of exceeding 5 percent absolute accuracy.

As a validation of the calibration of AVIRIS in flight, we present the results from an inflight calibration experiment held at Rogers Dry Lake, California on the 18 of May 1993. For this experiment AVIRIS was shown to have an absolute mean agree ment wi th an independent MODTRAN2a prediction of the upwelling radiance of 5 percent. The role of the onboard calibrator in achieving this ca] ibra tion i s di scussed as well .

Finally, we describe plans for the continued improvement of AVIRIS calibration procedures in the laboratory. These improvements in conjunction with an upgrade of the! onhoarcl calibrator are di rected towards the goal of approaching 2 percent absolute calibration accuracy for AVIRIS in flight.

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